

europia, terbia, dysprosia, holmia, erbia, thulia, ytterbia and lutetia, yttria, calcia and magnesia.

REMARKS

This is a response to the Office Action mailed on 14 August 2003. Claims 1 – 20 were rejected. Claims 1, 8, 10, 12, 14, and 20 have been amended. Claims 2 and 6 have been canceled. Claims 1, 3 – 11 and 13 - 20 remain for consideration.

In ¶ 2, Examiner rejected claims 8, 10, 14, 16, and 20 under 35 U.S.C. § 112, 2nd ¶ for allegedly failing to particularly point out and distinctly claim the subject matter Applicants regard as the invention.

In response:

- claims 8 & 14 have been amended to clarify that the coating includes a thermal spray structure, which is cauterized by layers of built up splats;

- claims 10 and 20 have been amended to clarify that the ceramic layer also includes one or more of the listed oxides.

- Applicants submit that the term “overlay coating” is well known in the art, including a typical composition referred to as “MCrAlY”, e.g., para. 26, and thus that there is not need to amend the claim language.

In ¶¶ 3 – 5, Examiner rejected claims 1 – 5, 9 under 35 U.S.C. § 102 as allegedly anticipated by U.S. Pat. Nos. 4,927,714 to Priceman, 4,321,311 to Strangman or 4,321,310 to Ulion; and claim 10 as allegedly anticipated by 5,514,482 or 4,880,614 both to Strangman.. In light of the above amendments and/or following remarks, Applicants respectfully request reconsideration of the rejection.

There is no mention in Priceman of a substrate comprising steels, superalloy, titanium alloy or copper alloy – as set forth in presently amended claim 1 - in Priceman. Priceman relates to a refractory metal composite coated article. The article includes a substrate 2, an intermetallic coating such as a silicide 4 and an outer ceramic coating 6. The substrate comprises a refractory metal. The coating 6 may include hafnia (col. 5, line 50), but there is no teaching or suggestion that the hafnia be combined with another material.

In Strangman '311, an article includes a superalloy substrate 1, a bond coat 2, and a layer of columnar ceramic 4. While Strangman '311 mentions the use of hafnia (col. 5, line 43) there is no teaching or suggestion that the ceramic include hafnia and gadolinia, as set forth in presently amended claim 1.

Likewise in Ulion, there is mention of a ceramic containing hafnia, but there is no teaching or suggestion that the ceramic include hafnia and gadolinia, as set forth in presently amended claim 1.

With respect to claim 10, Strangman '614 and '514 relate to a ceramic thermal barrier coating with alumina interlayer. Strangman '614 and '514 does mention the use of yttria stabilized hafnia – rather than just hafnia - (col. 5, line 54; col. 5, line1), but there is no teaching or suggestion that the ceramic include hafnia and gadolinia, as set forth in presently amended claim 1.

In ¶¶ 6 – 7, Examiner rejected claims 6 – 7 and 10 - 20 under 35 U.S.C. § 103 as allegedly unpatentable over by U.S. Pat. Nos. 4,321,310 to Ulion in view of Ketcham, Mase, Corning, or Rice. In light of the above amendments and/or following remarks, Applicants respectfully request reconsideration of the rejection.

Ulion is discussed above.

Ketcham '221 relates to a high toughness ceramic alloy. With reference to col. 3, lines 25 – 46, for example, Ketcham seems to teach complicated, several-oxide ceramic alloys (e.g., claim 1) most of which do not contain hafnia. On col. 4, lines 46 – 59 there is reference to hafnia base ceramics, but those ceramics may include zirconia, and do include other ceramics, including rare earth oxides. To the extent that hafnia is combined with another material, Ketcham appears to favor yttria, see col. 7, lines 14 – 18. Gadolinia is not specified.

Ketcham appears to suggest a need for or recommend further additions to such hafnia ceramics, including YNbO₄ and/or YTaO₄, which differ from the present invention. Moreover, Ketcham discusses Vickers Hardness and Fracture toughness, and does not seem to

mention the intended use or purpose of the ceramic alloy(s), nor teach or suggest that the materials are useful as thermal barrier coatings, nor that the ceramic coating is columnar grained.

Mase relates to high electric resistant zirconia and/or hafnia ceramics. To the extent that the ceramic includes hafnia, it also includes 5 – 30 mol. % of Group A (including gadolinia) AND 5 – 40 mol. of NbO_{2.5} or TaO_{2.5}. To the extent that presently amended claim 1 includes only hafnia and gadolinia, Mase does not teach or suggest such a ceramic thermally insulating layer. Moreover, to the extent that the present invention includes a third oxide in the ceramic (claims 10 and 20), neither of the present additional oxides involved Nb or Ta. As Mase relates to high electric resistant ceramics, it appears that Mase does not teach or suggest any utility as a thermally insulating ceramic layer, or that the ceramic can be applied to form a columnar structure.

Corning 'EP 773 appears to involve the same inventor Ketcham as the '221 reference above. '773 mentions a predecessor application to the other Ketcham reference, noting that the '221 reference relates to toughening hafnia ceramics with yttria and niobates and tantalates. The ceramic may include hafnia, and includes one or more "stability agents" and a toughening agent/ Page 2. lines 7 – 9.

The '773 reference does mention that the ceramic may include some gadolinia (up to 7% - selected from a large group of possible materials) and also includes at least one

“toughening agent”. (Page 2, lines 52 – 62). To the extent that presently amended claim 1 includes only hafnia and gadolinia, Corning ‘773 does not teach or suggest such a ceramic thermally insulating layer. Moreover, to the extent that the present invention includes a third oxide in the ceramic (claims 10 and 20), none of the ‘773 “toughening agents” are the same as the additional oxides of the present invention. Corning ‘773 does not teach or suggest any utility as a thermally insulating ceramic layer, or that the ceramic can be applied to form a columnar structure.

Rice relates to single crystal partially stabilized zirconia and hafnia based materials. Apart from requiring that the material be single crystal, Rice focuses on two properties – tensile strength and fracture toughness. Rice does mention ionic conductivity and electromagnetic transmissibility. There appears to be no mention of thermal insulating capability. Rice mentions that hafnia can be partially stabilized with many materials, including ~ 2 – 7 mol. % gadolinia (Abstract; Page 5, lines 20 – 27).

Applicant submits that there is no teaching, suggestion or motivation to combine these references, even if combined the combined ceramic would fail to teach several aspects of the inventive article, and there is no reasonable expectation of success were the Ulion and other references combined.

Ulion relates to ceramic coatings, for thermally insulating metallic substrates. The ceramic coatings may incorporate hafnia, but there is no teaching of what else the coating may comprise.

As noted above, none of the secondary references mention thermal insulation capability of the respective material, and thus do not appear to relate to thermal barrier coatings (Ketcham is silent on proposed uses; Mase discloses electrical resistivity; Corning '773 mentions toughness but is silent as to potential purposes; and Rice focuses on single crystal ceramics) – and thus do not relate to the central purpose of the present application. Accordingly, one skilled in the art would not look to the secondary references when looking to build upon the Ulion reference to modify hafnia for thermal insulating use. Even if the proposed combinations were made, the resulting ceramic would still fail to teach or suggest the articles of presently amended independent claims – including the substrate material and/or thermally insulating layer with hafnia and gadolinia.

Accordingly, and for at least the reasons set forth above, Applicant respectfully submits that currently amended independent claim 1 and 12 are in condition for allowance, as are the respective dependent claims.

Applicant petitions for a three month extension of time to file this response. Please charge our Deposit Account No. 21-0279 in the amount of \$930. for the petition fee.

Applicant believes that there are no other fees due for submitting this response.

For at least the foregoing reasons, Applicant submits that currently amended independent claims 1 and 12 and their respective dependent claims are allowable over the prior art of record. The Examiner is invited to contact the undersigned if there are any questions.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'F. Tyler Morrison', with a stylized flourish at the end.

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